ENDSEMESTER EXAMINATION MAY-2023

Course Name: - B.Tech. **Semester:- IV**

Paper Name: - Design and analysis of algorithm **Paper Code:- TCS-402**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

समय–3 घण्टे+ 20 मिनटप्रति घंटेअतिरिक्त–दृष्टिबाधित एवंसहलेखकपरीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 3 mark . All questions are compulsory.
- Section B- Answer any 5 out of 6 given questions in maximum hundred (150) words. Each question carries 7 marks.
- SectionC- Answer any 2 out of 3 given questions in maximum five hundred (500) words. Each question carries 10 marks.

निर्देश:

- प्रश्नपत्र मेंतीन खण्ड अ, ब, व स हैं।सभी खण्डअनिवार्यहैं।
- खण्ड–अमेंप्रत्येकप्रश्नतीनअंककाहै।सभीप्रश्नअनिवार्यहैं।
- खण्ड–बमें छः प्रश्नोंमें से किन्हींपाँचप्रश्नों के उत्तरअधिकतम150 शब्दोंमेंदें।प्रत्येकप्रश्नसातअंककाहै।
- खण्ड–समेंतीनप्रश्नोंमें से किन्हींदोप्रश्नों के उत्तरअधिकतम (300) शब्दोंमेंदें।प्रत्येकप्रश्न10अंककाहै।

Section – A (खण्ड–अ)

Objective Questions(वस्तुनिष्ठप्रश्न)

1. Answer allthe following questions. **5×3 =15**

निम्नलिखितसभीप्रश्नअनिवार्यहैं।

i) The time complexity or bubble sort algorithm is

a) $O(n)$
b) $O(\log n)$
c) $O(n^2)$
d) $O(n \log n)$

ii) Consider the following recurrence equation, $T(n) = \begin{cases} 1 & if\ n = 0 \\ 2\,T(n-1), & otherwise \end{cases}$ then $T(n)$ is

a) $O(n)$
b) $O(2^n)$
c) $O(n^2)$
d) $O(n^3)$

iii) Consider the following instance of the knapsack problem n=3, m=20, $(P_1,P_2,P_3)=(25,24,15)$ and $(w_1,w_2,w_3)=(18,15,10)$ the optimal solution is.

a) 31
b) 28
c) 28.5
d) 31.5

iv) Which of the following cannot be solved by backtracking method?

a) N queen problem
b) Subset sum problem
c) Hamiltonian circuit problem
d) Travelling salesman problem

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v) ___ means calculating the minimum amount of work required to solve the problem.

a) .Upper-bound
b) Lower–bound
c) Adversary
d) Problem reduction

Section – B (खण्ड–ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum 150 words. **5×7=35**
निम्नलिखितमें से किन्हींपाँचप्रश्नों के उत्तरअधिकतम 150 शब्दोंमेंदें।

i. Find big oh (O) and theta notation for the function $f(n) = 27n^2 + 16n + 25$
ii. Write the algorithm for linear search and find its time complexity
iii. Construct the Huffman coding for the following set of frequencies based on first 8 Fibonacci numbers a:1, b:1, c:2, d:3, e: 5, f:8, g:11, h:21.
iv. Write the Master theorem for decreasing function and dividing function.
v. Write the code for matrix multiplication and find its time complexity
vi. Discus best worst and average case with graphically
vii. Write the algorithm for Greedy method
viii. What is branch and bound techniques? Give the arrangement of 4 queen problems

Section – C
Descriptive Questions(विवरणात्मकप्र'न)

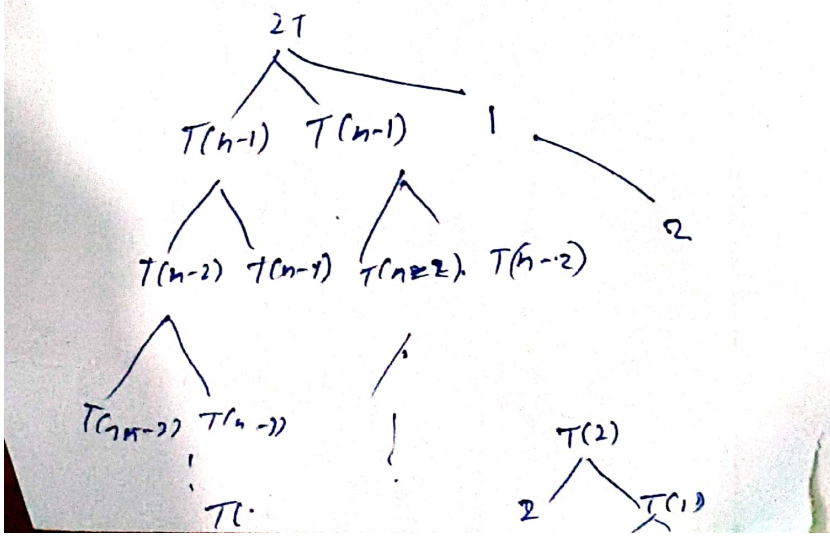
3. Answer any two of the following question in maximum 300 words. **2×10=20**
निम्नलिखितमें से किन्हींदोप्रश्नों के उत्तरअधिकतम300 शब्दोंमेंदें।

i) (a) Discuss the dynamic programming and multistage graph.
(b) Discuss the minimum spanning tree with the help of Prim's algorithm and Kruskal's Algorithm.

ii. (a) What do you mean by breadth first search (BFS)and depth first search (DFS)? Described it with an example.
(b) Write a short note on NP completeness.

iii. (a) If $T(n) = \begin{cases} 1, & if\ n = 1 \\ 2T(n-1) + 1, & if\ n > 1 \end{cases}$ find the Time complexity for given function by Recursion tree method

(b) If $T(n) = \begin{cases} 1, & if\ n = 1 \\ T(n-1) + n, & if\ n > 1 \end{cases}$ find the Time complexity for given function by substitution method



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